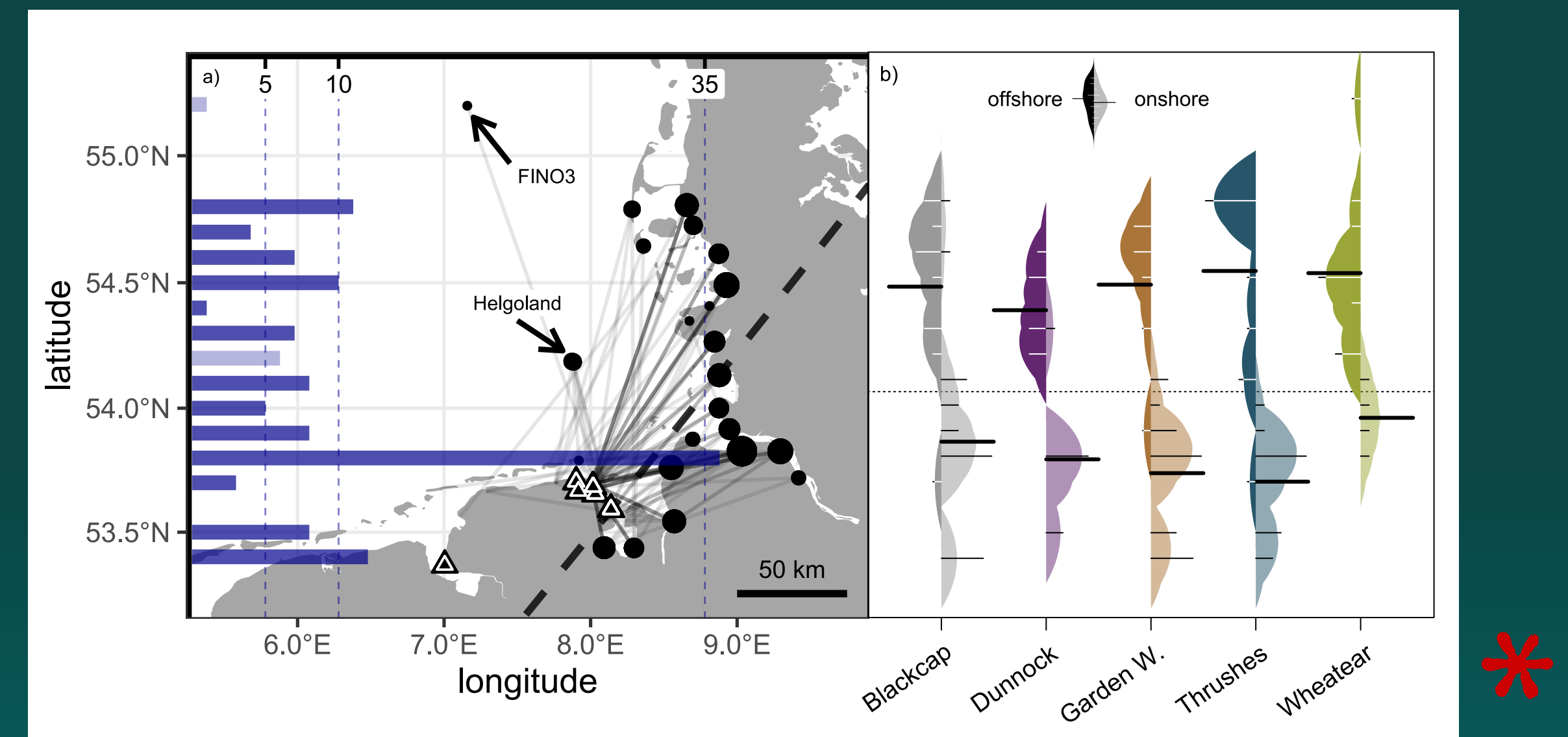


# Migration timing during spring depends on migration strategy while individual adjustments of migratory decisions are similar.



## Migratory decisions in birds with different migration strategies during spring

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### Introduction

The progress of bird migration is defined by a sequential series of **trade-off decisions**, including departure, routing, and landing decisions. In combination, these three decisions shape the spatio-temporal patterns of an individual movement, and are thus directly linked to the distance travelled per time unit and to energy consumptions interconnected to environmental conditions (Schmaljohann, Eikenaar, and Sapir 2022).

Individual departure timing during autumn migration likely depends on **migration strategy**, i.e. long- vs. short- to medium-distance migrants, and birds of both strategies differently react to prevailing environmental conditions at stopover (Packmor et al. 2020). However, it remains unclear whether migration strategy similarly affects the adjustment of migratory decisions during spring, when early arrivals at the breeding grounds should be mutually beneficial for individual reproductive fitness.

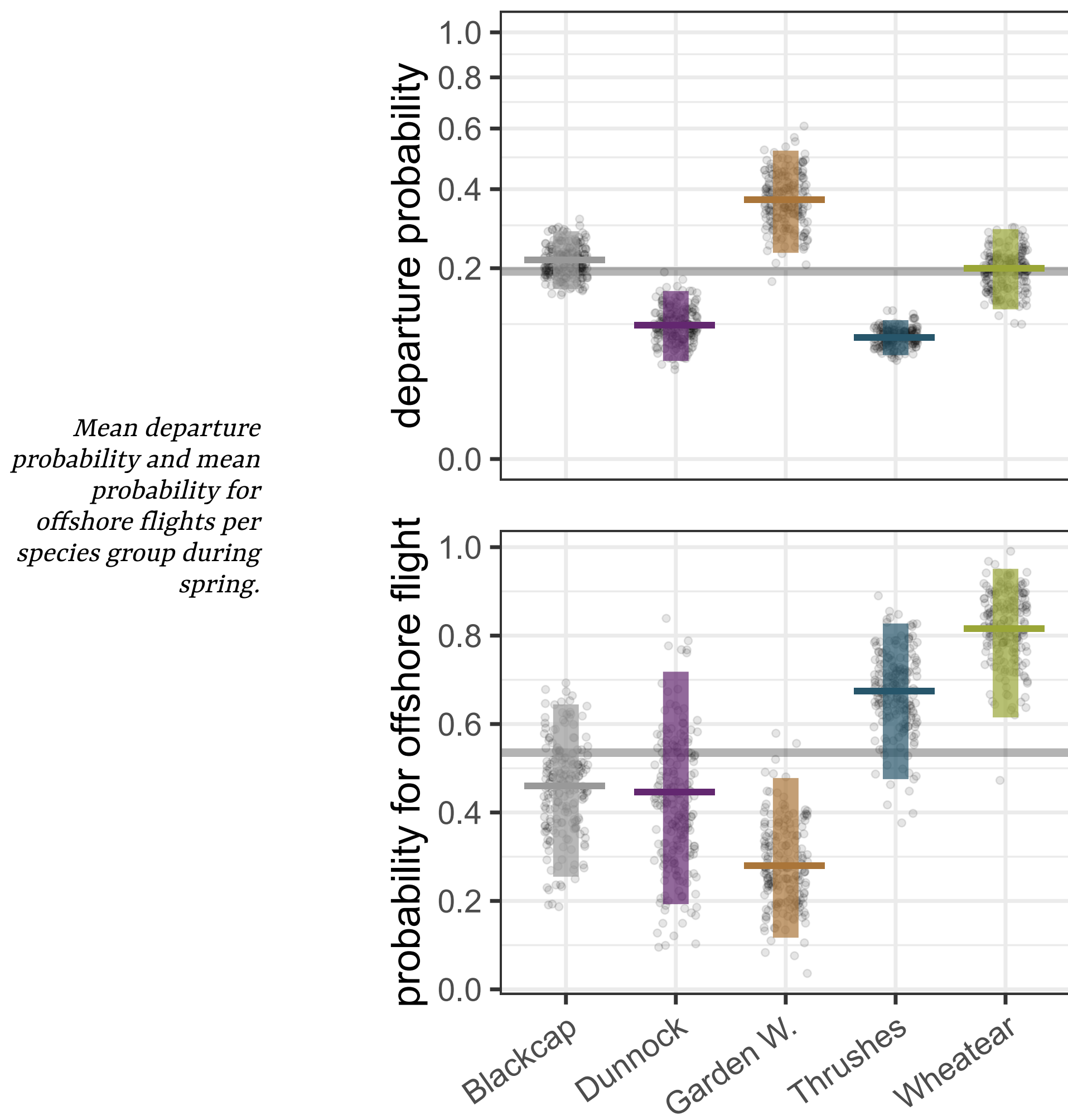
### Objectives

1. Do departure and routing decisions differ between migration strategies in spring?
2. How many birds cross the German Bight?
3. Does migration strategy affect how birds adjust migratory decisions?

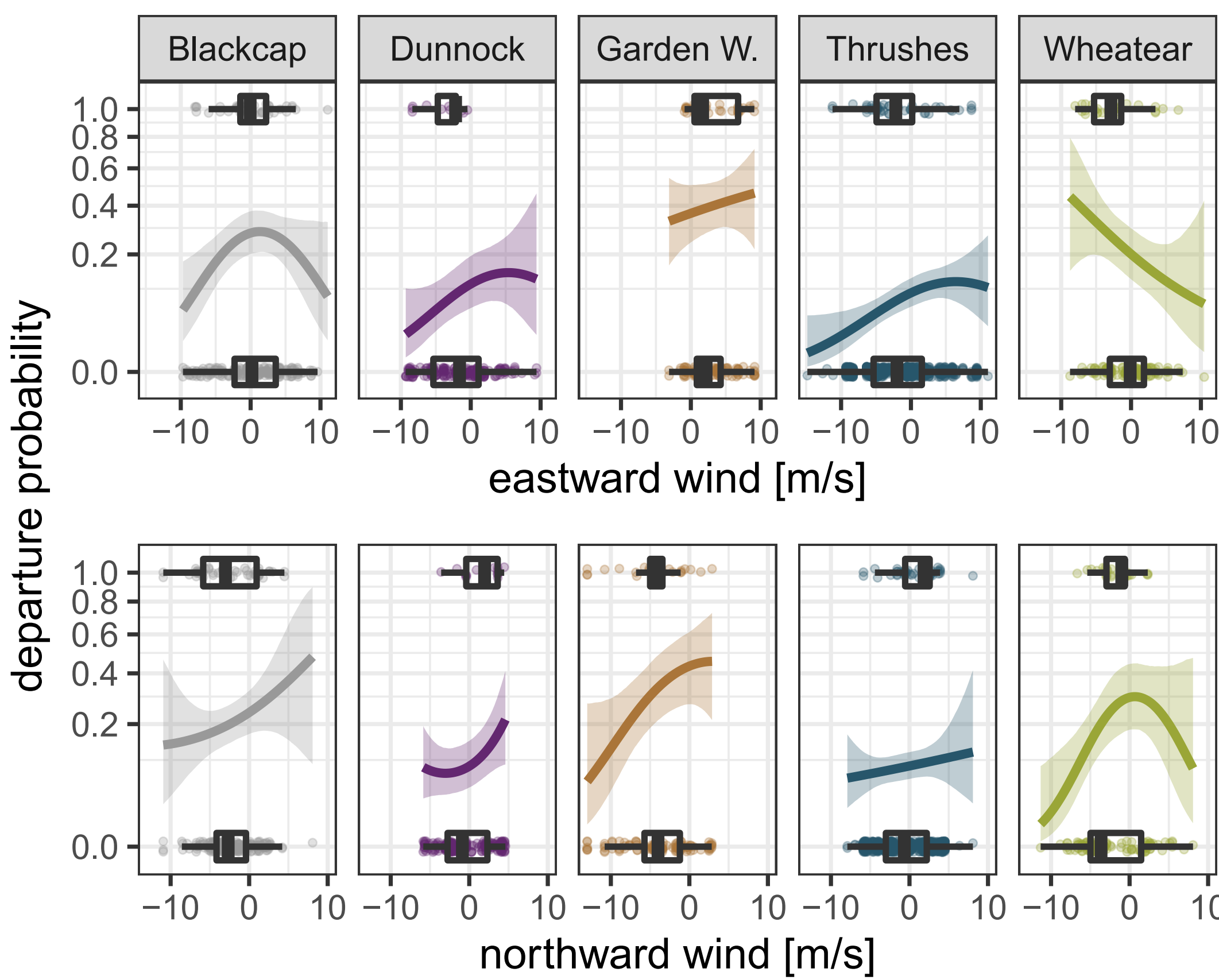
### Methods

We equipped 289 birds of seven songbird species from both migration strategies with radio tags at coastal stopover sites along the German North Sea coast during spring. Once departed, birds could either cross the German Bight or take a detour along the coast. Using a hierarchical multistate model, we estimated weather effects on daily migratory decisions, i.e. day-to-day departure decisions in concert with routing.

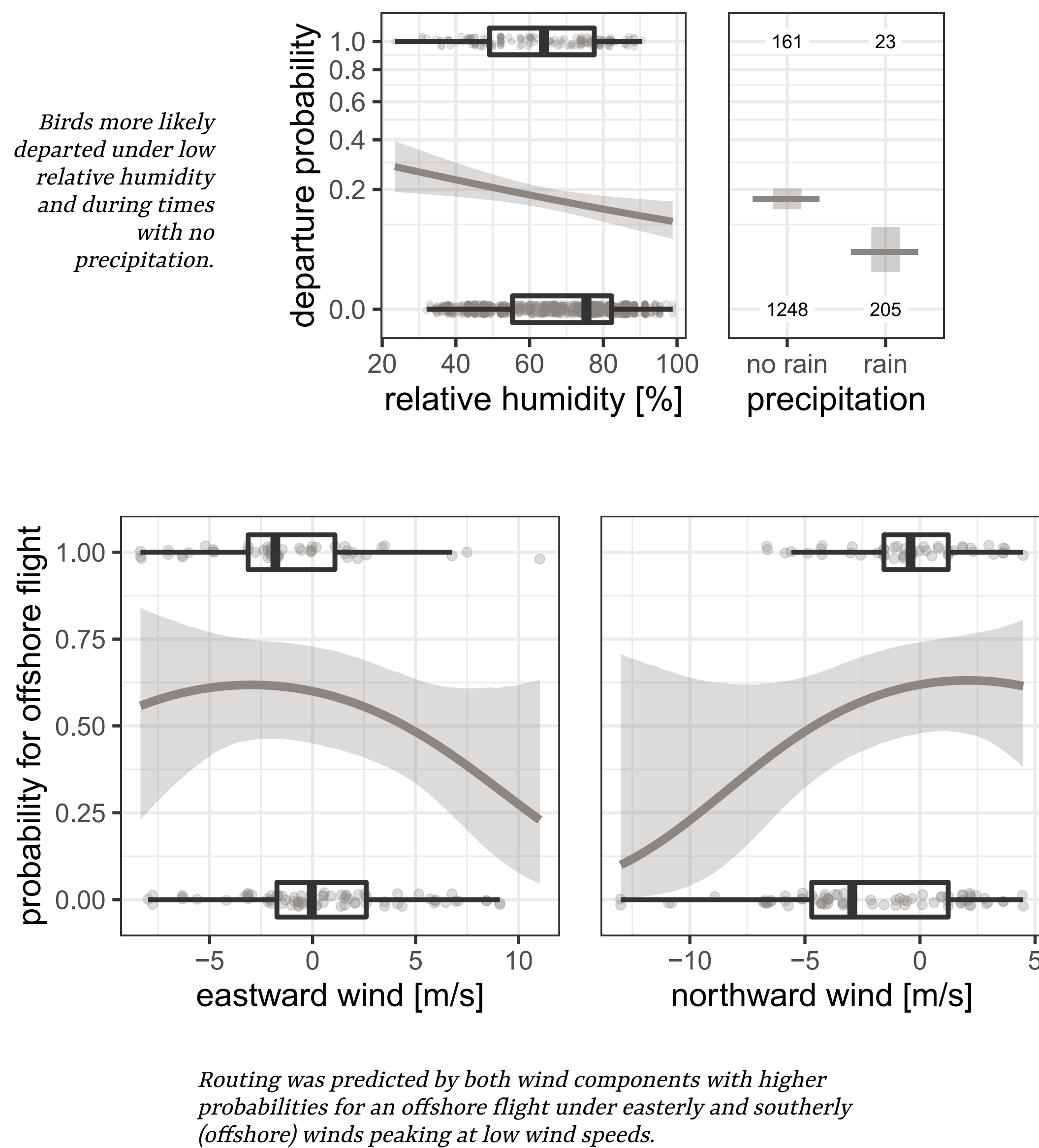
### Results



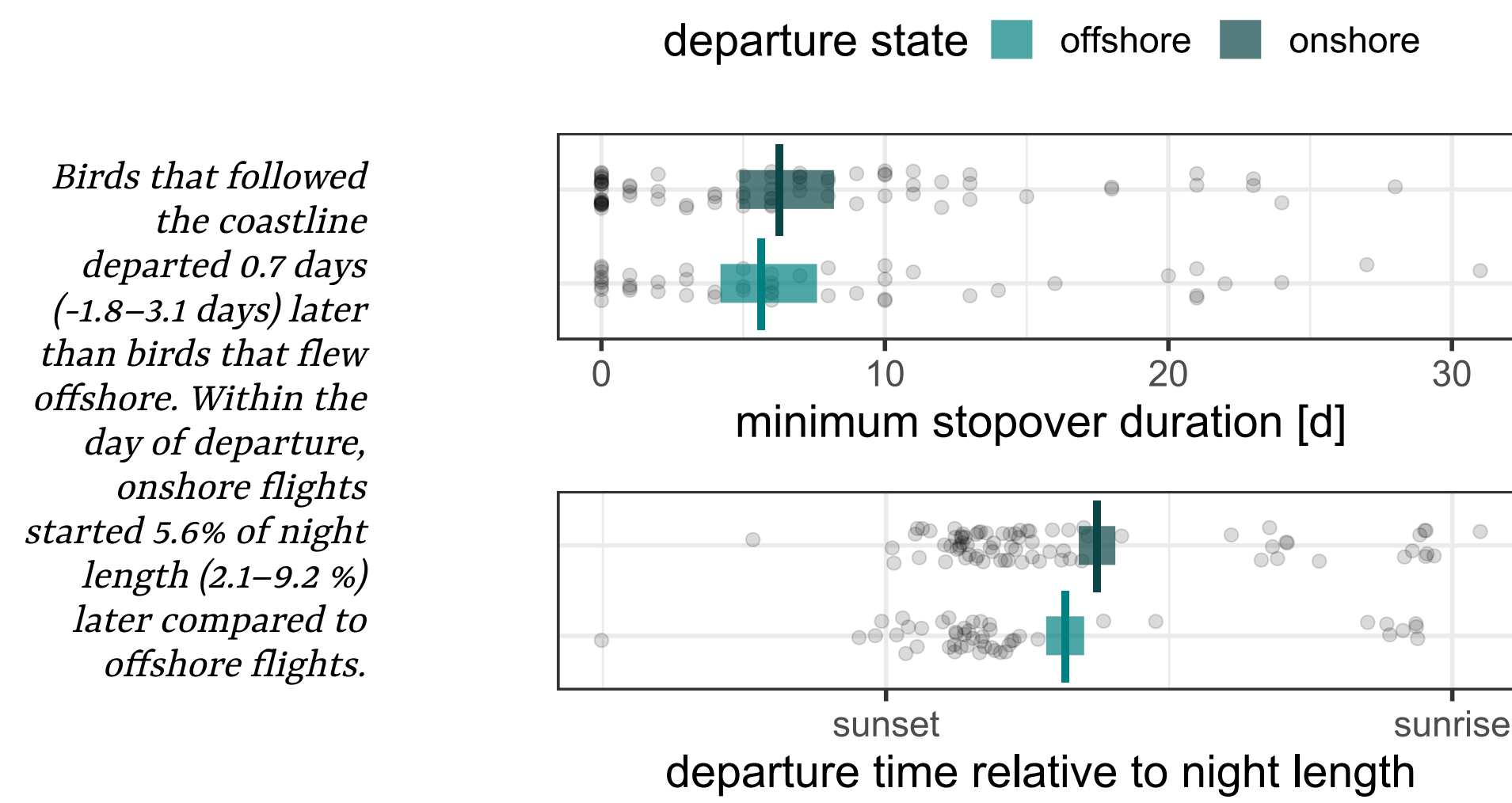
1. Day-to-day departure probability among species increased with migration distance independently from routing decision.
2. We estimated that 56% (95% CrI: 47.8–58.2 %) of all birds crossed the German Bight.



Birds more likely departed under westerly winds (easterly winds in Northern Wheatears) and light southerly winds.



3. We found no consistent differences in reaction norms to prevailing environmental conditions between migration strategies.



### References

Packmor, Florian, Thomas Klinner, Bradley K Woodworth, Cas Eikenaar, and Heiko Schmaljohann. 2020. "Stopover Departure Decisions in Songbirds: Do Long-Distance Migrants Depart Earlier and More Independently of Weather Conditions Than Medium-Distance Migrants?" *Movement Ecology* 8 (1): 1–16. <https://doi.org/10.1186/s40462-020-0193-1>.

Schmaljohann, Heiko, Cas Eikenaar, and Nir Sapir. 2022. "Understanding the Ecological and Evolutionary Function of Stopover in Migrating Birds." *Biological Reviews*. <https://doi.org/10.1111/brev.12839>.



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